

LIST OF CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

- 1) (currently amended) An apparatus for emitting electrons, comprising:
 - (a) a contiguous emission layer incorporating a plurality of protruding emitter tips, the emission layer formed from a mold, wherein the emission layer and the plurality of emitter tips are composed of a material having electron emitting properties;
 - (b) a selected portion of a first dielectric layer contacting the emission layer between the emitter tips, each emitter tip being contiguous with an opening in the first dielectric layer, the opening in the first dielectric layer being larger than a base of the protruding emitter tips;
 - (c) a dielectric support layer contacting the selected portion of the first dielectric layer, the opening in the first dielectric layer being contiguous with an opening in the dielectric support layer, the opening in the dielectric support layer defining a conical shape with sides defined by an inner surface of the dielectric support layer, the conical shape having an aperture at a vertex, the aperture being smaller than the base of respective protruding emitter tips, the opening in the dielectric support layer having a size; and
 - (d) a gate layer contacting the dielectric support layer, the opening in the dielectric support layer being contiguous with an opening in the gate layer, the opening in the gate layer having a size, wherein the size of the opening in the gate layer is equal to or greater than the size of the opening in the dielectric support layer.

2. (Original) The apparatus of claim 1 wherein the first dielectric layer is composed of silicon dioxide and the dielectric support layer is composed of silicon nitride.

3. (Original) The apparatus of claim 1 wherein the selected portion of the first dielectric layer is selected to provide a plurality of cavities disposed between the emission side of the substrate and the support layer, each cavity surrounding a group of emitter tips.

4. (currently amended) The apparatus of claim 1 wherein the selected portion of the first dielectric layer is selected to provide a cavity disposed between the emission side of the substrate and the support layer, the cavity containing a group of emitter tips and at least one support pillar, the support pillar being disposed between the substrate and the support layer, wherein the size of the opening in the gate layer is larger than the aperture.

5. (previously presented) The apparatus of claim 1 wherein the material having electron emitting properties is carbon-based.

6. (Original) The apparatus of claim 1 further comprising a cover layer in contact with the gate layer.

7. (currently amended) An apparatus for emitting electrons, comprising:

(a) a contiguous emission layer incorporating a plurality of protruding emitter tips, the emission layer formed from a mold, wherein the emission layer and the plurality of emitter tips are composed of a material having electron emitting properties;

(b) a selected portion of a first etch layer contacting the emission layer between the plurality of emitter tips, each emitter tip being contiguous with an opening in the first etch layer;

(c) a first intermediate dielectric layer contacting the selected portion of the first etch layer, the opening in the first etch layer being contiguous with an opening in the first intermediate dielectric layer, the opening in the first intermediate dielectric layer defining a first conical shape with sides defined by an inner surface of the first intermediate dielectric layer, the first conical shape having an aperture at a vertex, the aperture being smaller than the base of respective protruding emitter tips;

(d) a selected portion of a second intermediate dielectric layer contacting the first intermediate dielectric layer, the opening in the first intermediate dielectric support layer being contiguous with an opening in the second intermediate dielectric layer;

(e) a dielectric support layer contacting the selected portion of the second intermediate dielectric layer, the opening in the second intermediate dielectric layer being contiguous with an opening in the dielectric support layer, the opening in the dielectric support layer defining a second conical shape with sides defined by an inner surface of the dielectric support layer, the second conical shape having an aperture at a vertex, the aperture being smaller than the base of respective protruding emitter tips, the opening in the dielectric support layer having a size; and

(f) a gate layer contacting the dielectric support layer, the opening in the dielectric support layer being contiguous with an opening in the gate layer, the

opening in the gate layer having a size, wherein the size of the opening in the gate layer is as large or larger than the opening in the dielectric support layer.

8. (Original) The apparatus of claim 7 wherein the first etch layer is composed of aluminum.

9. (Original) The apparatus of claim 7 wherein the first intermediate dielectric layer is composed of silicon nitride or stable silicon dioxide.

10. (Original) The apparatus of claim 7 wherein the support layer is composed of silicon nitride or stable silicon oxide.

11. (Original) The apparatus of claim 7 wherein the selected portion of the second intermediate dielectric layer contacting the first intermediate dielectric layer is selected to provide a plurality of cavities disposed between the first intermediate dielectric layer and the support layer, each cavity surrounding a group of emitter tips.

12. (currently amended) The apparatus of claim 7 wherein the selected portion of the second intermediate dielectric layer contacting the first intermediate dielectric layer is selected to provide a cavity disposed between the first intermediate dielectric layer and the support layer, the cavity containing a group of emitter tips and at least one support pillar, the support pillar disposed between the first intermediate dielectric layer and the support layer, wherein the size of the opening in the gate layer is larger than the aperture of the second conical shape.

13. (Original) The apparatus of claim 7 further comprising a cover dielectric layer contacting the gate layer.

14. (previously presented) The apparatus of claim 7 wherein the material having electron emitting properties is carbon-based.

Claims 15-24 (Cancelled)

25. (new) The apparatus of claim 1 wherein the first dielectric layer etches at a faster rate than the dielectric support layer.

26. (new) The apparatus of claim 7 wherein the first etch layer etches at a faster rate than the first intermediate dielectric layer.